

SCIENCE

VOL. 76

FRIDAY, JULY 22, 1932

No. 1960

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SCIENCE: A Weekly Journal devoted to the Advancement of Science, edited by J. McKEEN CATTELL and published every Friday by

THE SCIENCE PRESS

New York City: Grand Central Terminal
Lancaster, Pa. Garrison, N. Y.

Annual Subscription, \$6.00 Single Copies, 15 Cts.

SCIENCE is the official organ of the American Association for the Advancement of Science. Information regarding membership in the Association may be secured from the office of the permanent secretary, in the Smithsonian Institution Building, Washington, D. C.

THE SYRACUSE MEETING OF THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE AND ASSOCIATED SOCIETIES

Edited by Dr. CHARLES F. ROOS

PERMANENT SECRETARY

GENERAL FEATURES

THE ninetieth meeting of the American Association was held at Syracuse from Monday, June 20, to Saturday, June 25, 1932. The preliminary announcement of this meeting, which was the first meeting of the association at Syracuse, appeared in SCIENCE for May 27, and the general program was published at Syracuse on Monday, June 20. Copies of the program may be secured free from the Washington office of the association.

The president for this meeting was Dr. John Jacob Abel, eminent pharmacologist and medical research worker. Dr. Abel presided at the opening general session on Monday evening.

Four hundred and twenty-six persons registered at the association's registration offices in the entrance

of Lyman Hall of the Syracuse University. A check of registration by societies and sections indicates, however, that over one thousand were in attendance. These were distributed about as follows:

Mathematics	39	Economics, Sociology	
Physics	20	and Statistics	50
Astronomy	30	Historical Sciences	30
Chemistry	122	Engineering	40
Zoology	137	Medical Sciences	170
Botany	82	Agriculture	100
Anthropology	50	Education	50
Psychology	140		

The general program shows that 289 authors presented 260 papers. Many contributions were made by joint authors. The papers were distributed among the sciences about as follows:

Mathematics	6	Economic and Social	
Chemistry	36	Sciences	15
Astronomy	12	Historical and Philo-	
Geology and Geogra-		logical Sciences	6
phy	16	Engineering	8
Zoology	7	Medical Sciences	68
Botany	3	Agriculture	21
(Several field trips)		Education	19
Anthropology	6	Science in general	9
Psychology	28		

There were numerous picnics, society dinners and luncheons.

THE SYRACUSE COMMITTEES

The general local committee, together with its various sub-committees, merits and receives the lasting gratitude of all who attended the A. A. A. S. meetings and especially of the officers. Chancellor Charles Flint, of Syracuse University, Dr. Hugh P. Baker, as general chairman of the local committees, and Dr. Albert L. Elder, as secretary of the general local committee, together with all who cooperated with them, are to be congratulated for the unselfish spirit which they have shown as they sacrificed their time, thought and energy in the hope that the progress of science might be helped thereby. The personnel of the local committee was published in *SCIENCE* for May 27.

THE PRESS SERVICE

(By Austin H. Clark, Director)

Entirely unexpected was the relatively large amount of press notice resulting from the association's second summer meeting at Syracuse. At the time of year when schools and colleges are closing for the summer and people are beginning to think largely of the out-of-doors and of vacations, it is futile to expect any such extensive publicity as is possible at those seasons when most people are more or less grimly serious—interested in learning something rather than simply in being amused or thrilled. And this year the situation was complicated by the great political conventions, one occurring just before and one just after the meeting. As a result of these conventions it was anticipated that politics would occupy the space that under other circumstances would be available for scientific news.

But these anticipations proved to be unfounded. Most excellent and adequate accounts of the daily proceedings at Syracuse appeared in the press throughout the country, often finding a place on the first page of papers in cities far distant from Syracuse. The main reason for this was the increasingly

close cooperation between the members and the Press Service. In advance of the Syracuse meeting this cooperation left nothing to be desired. The proportion of the papers read that reached the Press Service in advance was greater than ever before, and without exception the manuscripts and abstracts were in most excellent shape.

Although the number of papers presented was, when compared with those delivered at the winter meetings, relatively small, many of them included unusually good material for popular exposition. As a result of the excellence of the material and of its presentation, and also of the early receipt of the papers, the representatives of the press were able to prepare most interesting as well as accurate accounts of the meeting, reflecting the greatest credit on them and at the same time presenting the work of the members of the association to the general public in the most desirable light.

GENERAL SESSIONS

Beginning with Monday afternoon at 3:00 P. M. and extending through Friday evening there were thirteen general lectures given on a variety of subjects, which included anthropology, psychology, botany, public health, astronomy, history, engineering, mathematics, physics, economics and the exposition of science.

Dr. Richard Thurnwald, of the University of Berlin, discussed some traits of society in the South Sea Islands with special reference to the house types, settlements and social organizations of groups in New Guinea and the Solomon Islands. He pointed out that racial, social and cultural distinctions rarely coincide with linguistic distinctions and warned against dogmatism.

In the Monday evening lecture, on "The Psychology of Capital," Dr. Edward L. Thorndike, of Columbia University, said that saving to create capital goods is in part due to a craving for power and for the approval of the world and one's self. Different individuals value power differently. Some seek it through physical force, some by intellect and special talents, some by popularity, some by official status, some by ownership or control of material wealth. Material wealth is very clearly power to trade and to manufacture. Consequently, the business man not only craves some special capital on which to exercise his abilities, but also capital in general to turn into general industrial or commercial power, and so do many others than business men. But power through bank deposits or stock certificates is a rather remote and dull thing compared with power through strength or beauty or popularity or skill.

Dr. Rodney H. True, of the University of Pennsylvania, discussed the toxicity of inorganic substances. He defined toxic equivalent to be the strongest concentration of a substance that just permits life to persist in the primary roots of *Lupinus albus* placed in the solutions for a period of 24 hours. His experiments have shown that the commoner inorganic anions have a relatively low toxic activity, the kation being usually the harmful component. An attempt to draw a parallel between the toxic equivalents of the kations and anions making up a long series of inorganic substances and (1) their atomic weights, (2) electrolytic solution tensions and (3) speeds of migration showed no consistent relation between these physical and chemical constants and the physiological characteristic, the toxic equivalent. He advanced the conclusion that tolerance or susceptibility of plants to the substances studied is the result of a geologically-old process of accommodation of plants to their solution-environment. This solution-environment has never consisted of solutions of single substances, like those tested in the laboratory, but has always consisted of mixtures of substances that mutually antagonize each other's toxic properties, approaching a more or less perfect "physiological balance."

On Tuesday afternoon Dr. Dixon R. Fox, of Columbia University, delivered a general address on "Refuse Ideas and Their Disposal" in which he showed how certain beliefs and practices, such as astrology, bleeding and others accepted as established truths by the scientists of one generation, gradually disappeared from intellectual society but continued to exist in the lower strata of civilization. The theological garments once worn in New Haven now cling to the mountaineers of Tennessee and Arkansas.

On Tuesday afternoon Dr. W. G. Smillie, of the Harvard School of Public Health, said that many students of acute respiratory infections have felt that common colds are infectious and are spread by direct contact. Others have believed that environmental factors are important, either as causal or contributory agents. Epidemiological studies under conditions in which various possible etiological factors could be studied under controlled or at least measurable conditions were conducted in an isolated community on the Patsiliga River in Alabama, at North West River, a Hudson Bay fur trading post in the interior of Labrador, as well as at St. John, one of the small Virgin Islands in the West Indies, at Spitzbergen, a Norwegian coal-mining community within the Arctic Circle. Serial bacteriological cultures were made of the naso-pharyngeal flora of the people in health and also during periods of illness with acute respiratory disease. Careful epidemiological data were kept of

the incidence of each case of acute respiratory disease in the areas. Various environmental factors, such as daily variations in temperature, relative humidity, wind velocity, sunshine, precipitation and, in Spitzbergen, air ionization were measured. In all the areas which he studied epidemic colds seemed to be caused by a specific infectious agent (probably a filterable virus) which was spread by direct contact, with an incubation period that lasted about thirty-six hours.

Dr. Thomas Parran, Jr., state commissioner of health, gave a brief survey of the development of the public health movement in Onondaga County, and credited Joshua Forman, a pioneer, as being its instigator.

In the early days of public health, organized effort was maintained only to combat disease and, once an epidemic had subsided, the united fight against disease stopped. The duties of the early health officer were nothing more than a fight against visible filth. The death rate from tuberculosis in New York state during the past fifteen years has been reduced 50 per cent. Approximately forty-six thousand people are living to-day because the 1913 death rate has been thus reduced.

On Tuesday evening Dr. J. O. Perrine, of the Bell Telephone Laboratories, lectured on "Television, Its Fundamental Physical and Psychological Principles." He illustrated the operation and functions of the principal elements of the television transmitter and receiver. The photoelectric cell, aptly called the electrical eye, was connected to a neon receiving lamp with a vacuum tube amplifier intervening. It was thus possible to demonstrate that light variations at one point, those of a fluttering match, can immediately produce changes in the intensity of the light emitted by the neon lamp.

An important property of both the photoelectric cell and the neon lamp as elements of a television system is their speed of response. To articulate this property, the light of the neon lamp was modulated by currents from an electrical phonograph reproducer.

Pictures are substitutes for vision. A two-dimensional phenomenon thereby replaces a three-dimensional one. In television, a two-dimensional phenomenon in space is transmitted by a one-dimensional system in space. Wire and radio circuits are single-track systems, that is, one-dimensional systems. Hence, the element of time must be substituted for one dimension in space. This means that pictures can not be sent as a whole, but must be sent on the instalment plan. At the receiving end of the television system the succession of picture elements in

electrical form are retranslated into light variations and reassembled in two dimensions.

This translation of two-space dimensions into one-space and time dimension is accomplished by the principle of scanning with a spot of light. The obtaining of individual picture elements by a rapidly moving spot of light traveling in parallel lines was demonstrated. With the room in darkness, the face of one of the audience was slowly scanned, with no recognition on the part of the audience. However, when rapidly scanned, the face was recognized as if it were all illuminated by a floodlight. The persistence of vision on the part of the human eye as contrasted with the electrical eye is a psychological factor capitalized in television.

Professor Earle R. Hedrick, of the University of California at Los Angeles, made a plea for closer cooperation between mathematicians and educationalists. He urged that state laws be passed requiring teachers of science to have had at least one college course in the science they teach.

Professor Walter B. Carver, of Cornell University, emphasized the need for inspired science text-books and teachers of science. He pointed out some of the contributions of mathematics to science, indicating how branches of mathematics which interested only the mathematicians twenty-five years ago are now prescribed and necessary for physicists and engineers.

On Wednesday evening Dr. W. F. G. Swann, of the Franklin Institute, gave an illustrated lecture on "Cosmic Rays." Over land, the main sources of atmospheric ionization are the radioactive materials in the soil and in the atmosphere. Over the great oceans, where there is a negligible amount of radioactive material, or in vessels over land when shielded from radioactive influence, ions are produced at a constant rate which increases with altitude, indicating a source of ionization external to our atmosphere. This source of ionization is known as the cosmic radiation. The lecture described experiments made in balloons, on mountains, and lakes at high altitudes, with the object of ascertaining the nature of this radiation. The evidence for the various possibilities, electron rays, photons and neutrons was discussed; and the recent experiments by Millikan and his school, concerned with the disintegration products produced by the radiation in Wilson cloud chambers, were described. These experiments show the existence of secondaries of both positive and negative charge, with energies extended up to a thousand million volts. The lecture was illustrated by experiments demonstrating the normal conductivity of the air, the existence of radioactive material in the atmosphere, and the existence of the cosmic radiation as shown by systems of Geiger Counters.

In a general address on "Solar Coronal Problems" Dr. Frederick Slocum, of Wesleyan University, discussed coronal form, structure and motion. He pointed out that the spottedness of the sun and more especially near the limb on the eclipse day was of more significance in determination of form than the mere stage in the solar cycle.

In the Thursday evening address, Dr. Graham Lusk, of New York City, explained the contributions of his friend, Max Rubner, to the science of nutrition. Dr. Lusk's address will be published in full in an early number of SCIENCE.

Dr. Henry Crew, of Chicago, delivered the final evening lecture on "The Exposition of Science." He passed from a discussion of the systematic presentation of science at school and college to the difficulty connected with the putting of science before the public through the press. An outline of commercial expositions of ancient and medieval times was followed by a sketch of more recent international expositions in which each of these was shown to have an individuality and character of its own. The distinguishing feature of the Chicago Exposition of 1933 was found in its principal theme, which is the indebtedness of industry and engineering to pure science and the increased leisure which has come to society. The speaker's remarks were confined to what had already been accomplished at Burnham Park, Chicago, and these results were clarified by the use of some eight or ten slides at the close of the lecture.

SECTION A (MATHEMATICS)

(Report from Floyd A. Decker)

Section A held two sessions on Tuesday for the reading of three papers. In the morning session Professor H. M. Gehman, of the University of Buffalo, developed several theorems on the homeomorphic geometry of the projective plane. He showed how analysis situs can be thought of as a branch of geometry. Professor W. A. Hurwitz, of Cornell University, discussed logical foundations for groups and fields. In the afternoon session Professor J. A. Shohat, of the University of Pennsylvania, considered a number of problems in interpolation. Among these were the problems of convergence and stability (the extent to which errors in the given values of $f(x)$ affect the interpolating function) of approximating polynomials and other functions. On Wednesday morning Section A joined with Section K for a session on mathematical statistics and a report on collegiate mathematics needed by social scientists (see report of Section K). On Wednesday afternoon members of Section A attended a general session on the teaching of mathematics to hear Professor Earle

R. Hedrick and Professor W. B. Carver (see General Sessions).

SECTION C (CHEMISTRY)

(Report from C. C. Spencer, W. C. Coleman, C. M. Schwartz)

The program of Section C consisted of that of the intersectional meeting of the Northern New York sections of the American Chemical Society.

Dr. J. B. Sumner, of Cornell University, concluded from many observations that enzymes, such as urease, are proteins and that antiurease reacts stoichiometrically with urease. Dr. V. K. LaMer, of Columbia University, concluded that calcium is more likely to be the limiting factor in nutrition than phosphorus. He said that bone growth and other calcification takes place when the blood is supersaturated with tertiary calcium phosphate.

A second paper by Dr. LaMer introduced a new field in chemistry, the reaction of acids with bases in solutions other than aqueous. He showed that it is possible to arrange many acids in the order of their increasing strength in benzene. By the use of Z-rays, Dr. Neil Gordon, of the Johns Hopkins University, showed that in dyeing cloths a chemical reaction occurs between a dye and the mordant. P. G. Newsome, of the Eastman Kodak Research Laboratory, correlated the swelling and solvating action of many organic solvents with functions involving their dielectric constants or dipole moments. Dr. A. W. Browne, of Cornell University, exhibited some glassy crystals, compounds of nitrogen and hydrogen, which were so stable that strong detonation was necessary to explode them. Dr. V. J. Chambers and Dr. Linus Webb, of the University of Rochester, described an ingenious device for filling and evacuating a barometer or manometer.

At a luncheon on Friday noon, attended by nearly one hundred, Dr. R. T. Baldwin, of New York, treasurer of the American Chemical Society, gave an interesting talk on "Some Books Which Chemists Do Not Read." He referred to the verbatim reports of important patent suits and of important hearings before tariff and other government commissions.

At the Friday afternoon session, Dr. R. C. Young, of the Massachusetts Institute of Technology, offered an explanation of the mechanism of the oxidation and reduction of tungsten and molybdenum in complex cyanides where these elements pass from a trivalent or pentavalent to a tetravalent state. G. R. Fonda, of the General Electric Company, described a new type of cathode ray tube to be used for the quantitative analysis of metals. Time is saved by having the target outside the ionization chamber, thus facilitating change of the target substance. The

cathode ray method has the advantage over the ultimate ray method in spectroscopy in that percentages as high as 95 can be readily determined. Dr. A. J. King, of Syracuse University, reported that x-ray studies of subfluorides of the alkaline earths discredit the theory of the formation of subsalts of barium.

SECTION D (ASTRONOMY)

(Report from Philip Fox)

As expected, the attendance at Syracuse was small, about thirty for each of two sessions; astronomers are preoccupied with preparations for the solar eclipse of August 31. Comments are limited to a few of the sixteen papers presented.

R. C. Williams described an interesting method of deposition of chromium on glass for reflectors. The success of his process and the high reflecting power of the product, especially in the ultra-violet, may be of great value to astronomy. F. G. Pease described the new support for the 100-inch mirror. By the use of ball-thrust bearings the friction between the supporting disks and glass and the distortions from this cause have been largely eliminated.

Dr. S. B. Nicholson and Miss E. E. Sternberg estimate the date of sun-spot minimum between 1933.6 and 1934.8. The date of minimum is important in view of the approaching solar eclipse and the coronal form to be expected. Professor Frederick Slocum, however, in his address on "Solar Coronal Problems," pointed out that the spottedness of the sun on the eclipse day and more especially near the limb is of more significance in determining the form of the corona than the mere stage in the solar cycle.

Calculations of Dr. Ross Gunn indicate that the magnetic and electric forces in the sun's atmosphere far exceed those of gravity and radiation pressure and should determine the stability and provide the mechanism for the support of the corona. He urged that observations of the rotation of the upper chromosphere and corona be included in eclipse programs. R. S. Richardson finds evidence for all three of the strongest bands of the hydrocarbon molecule at $\lambda 4300$, $\lambda 3900$, $\lambda 3143$, in the solar spectrum. He finds also a temperature gradient of 13° per km and relative pressure in sun-spots and reversing layer of 0.48. R. W. Shaw identifies members of the OH bands at $\lambda 3064$ and $\lambda 3428$ in the solar spectrum and from a study of the intensities of the lines derives a solar temperature of 5100° C. W. S. Adams and Theodore Dunham found three new bands in the infra-red spectrum of Venus at $\lambda 7820.2$, $\lambda 7882.9$ and $\lambda 8688.7$, all degraded toward the red. Evidence indicates that they may be due to carbon dioxide.

The report of Professor S. L. Boothroyd on the

Arizona Meteor Expedition indicates an astonishing number of meteors observable in the clear atmosphere of Flagstaff. Ascent of the San Francisco Peaks to 10,500 feet resulted in large additional gains. Velocities of 200 to 300 km/sec for the telescopic meteors are frequent.

By a systematic search Dr. R. E. Wilson has more than doubled the membership of the Taurus cluster. He adds 221 "group stars" with spread of the group to diameter 250 parsecs. Dr. R. F. Sanford presented accumulated evidence for the presence of the carbon isotope C_{13} in stars of classes R and N. The bands and their growth in sequence of three class R and four class N stars were shown by slides. A paper by Dr. Paul W. Merrill gave evidence that the line $\lambda 5577$ of novae is identical with the green line of the aurora and that the pressure in the emitting shells of novae is between that of the nebulae and the tenuous auroral strata of the earth's atmosphere.

SECTION E (GEOLOGY AND GEOGRAPHY)

(Report from Kirtley F. Mather)

Section E joined with Section O and with the American Society of Agronomy for the symposium on "Land Use" which was held on Tuesday morning, June 21 (see report of Section O), and on Tuesday afternoon it participated in the symposium on "Aerial Photographic Surveying and Mapping," organized jointly with Section M (see report of Section M). On Wednesday morning there were nearly 100 in attendance upon the session devoted to papers on physiography and glacial geology. About 65 participated in the field excursion that afternoon to the Clarke Reservation Plunge Basin, Tulley Moraine, Labrador Hollow and Skaneateles Lake. Dinner at the Kan-Ya-To Inn was enlivened by reminiscences offered by Professor W. H. Hobbs and Dr. Rudolf Ruedemann.

At the Thursday morning session there were several interesting papers on stratigraphic problems of the Syracuse region. The afternoon field trip was likewise devoted to the study of local stratigraphy. On Friday, June 24, about 35 members of Section E participated in an all-day field excursion to Frankfort Gorge, Little Falls, Dolgeville, Trenton Falls and Utica. All in attendance were especially grateful to Professor George B. Cressey, local representative for Section E, and to Professors E. T. Apfel and L. W. Ploger, leaders of the field excursions, for the excellent service which they rendered.

SECTION F (ZOOLOGICAL SCIENCES)

(Report from George T. Hargitt)

The sessions of Section F began on Tuesday morning with a round table discussion on "Methods of

Rearing and Maintaining Cultures on Invertebrate Animals," led by Dr. J. G. Needham, of Cornell University. The interesting presentation of experimental data and the abundant discussion made this a most valuable contribution to the meetings. The emphasis for this summer meeting was placed upon field excursions and informal discussions, Section F joining with the Botanical Society of America, the Ecological Society of America and other botanical groups. On Tuesday evening Dr. W. L. Bray, of Syracuse University, in outlining the features of the places to be visited on the excursions, gave an interesting address on the "Physiography, Ecology, Fauna and Flora of the Syracuse Region." For further details see the report of Section G. Drs. J. G. Needham and A. H. Wright, of Cornell University, Dr. C. C. Adams, of the New York State Museum, and Dr. Charles E. Johnson, of the New York State College of Forestry at Syracuse University, were the zoological leaders; prominent botanists and ecologists led discussions in their fields. These field excursions and discussions were very successful and valuable and were enjoyed by the large number who attended; the union of botanical, ecological and zoological interests in the same field trips proved to be unusually attractive. The success of these trips was largely due to the care exercised in the choice of regions and leaders and the attention given to all necessary details. An informal reception on Tuesday evening and a dinner on Wednesday evening brought all biologists together in pleasant social gatherings. The individuals and committees of arrangement for the biological meetings have the thanks of the visiting biologists.

SECTION G (BOTANICAL SCIENCES)

(Report from A. J. Eames and H. F. A. Meier)

The Botanical Society of America, following the custom established in 1929 of holding summer meetings, met on June 21, 22 and 23, joining this year for the first time with the American Association. (The Pacific Section of the society joined in the Pasadena meeting of 1931.) In its earlier independent meetings the society has found meetings less formal in nature than the winter meetings, with emphasis on field trips, to be most satisfactory, and the Syracuse meeting, planned on this basis, was also most successful. Union with other biologists—members of Section F, the Ecological Society of America, the American Fern Society, the Torrey Botanical Club and Syracuse botanists—in field trips and general meetings added greatly to the success of the meeting.

On Tuesday the forenoon was given to demonstrations and exhibitions in cytology, morphology and physiology. Dr. P. J. Sedgwick, of Syracuse Univer-

sity, showed excellent motion pictures of plant growth and development and of the preparation of material for laboratory teaching. In the afternoon about 85 members took the field trip to Green Lake and White Lake in the Jamesville region. Here limestone ridges and talus slopes, with colonies of the rare *Scolopendrium*, and the boggy shores of marl lakes were visited. Attention was given to the unusually interesting glacial geography of the region.

In the evening Dean W. L. Bray, of Syracuse University, addressed a joint meeting on "Some Aspects of the Physiography, Ecology, Flora and Fauna of Central New York." Following the lecture an informal reception for biologists was held in the rotunda of the Forestry Building.

All day Wednesday was given to an excursion to the Junius region. With perfect weather about 85 members enjoyed the opportunity of studying the flora and fauna of one of the most interesting regions botanically and ecologically in Central New York. About a group of small ponds are marl bogs and moors, peat bogs, and sandy fields and woodlands, presenting an unusual combination of habitat and soil conditions, and many rare plants and animals. The effect of soil on local plant distribution is striking in this small area.

In the evening an informal dinner for all biologists was held in the Home Economics Cafeteria, with Dean W. L. Bray presiding.

On Thursday morning a round-table discussion of cell wall structure, led by Dr. W. M. Harlow and an exhibition of rare and unusual plants collected on the field trips held the attention of members. In the afternoon about 25 persons visited the salt flats about Onondaga Lake on the outskirts of the city of Syracuse, noting the plants of coastal salt marshes to be found there. The party then continued to the sandy ridges and peat bogs of Phoenix.

With a registration of 82 botanists and an attendance of about 100, and with the opportunities provided by the informal nature of the gathering for the making and renewing of acquaintanceships, the meeting was most successful.

SECTION H (ANTHROPOLOGY)

(Report from Carl E. Guthe and D. G. Haring)

Section H held two sessions on Monday, June 20, both of which were devoted to the consideration of certain aspects of cultural problems centering about Oceania. D. S. Davidson, of the University of Pennsylvania, opened the meeting with a presentation of some problems of Australian culture. He said that the distribution of several forms of stone implements is correlated with factors of climate, utility and past

and present agencies of diffusion. Some of these traits may be indigenous, others may have originated outside of Australia.

Mrs. Willowdean C. Handy, of the B. P. Bishop Museum of Honolulu, showed that the elaborate and highly conventionalized art of the Marquesan people to-day is the result of the mixture of two schools, one of which was that of the wood carvers, who emphasized the human form, and the other that of the tattooers, who tended more towards animal and plant designs.

Miss Helen H. Roberts, of the Institute of Human Relations at Yale University, opened the afternoon session by presenting a chart upon which had been plotted the distribution of peculiar and unnatural cultural traits throughout the world, with special reference to southeastern Asia, to Oceania, and to the New World. These traits included such customs as the use of conch shell trumpets, distending the ear lobe, making bark cloth, mastication of plant roots for ceremonial drinks, cutting the hair in patterns, certain types of mutilation, etc. The most striking result of such a tabulation was the demonstration of the grouping of some of these traits in certain culture areas and their concentration in widely separated regions.

Dr. Richard Thurnwald, of the University of Berlin, discussed some traits of society in the South Sea Islands (see General Sessions). The importance of ethnobotanical research in the study of cultures was then emphasized by E. S. C. Handy, of the B. P. Bishop Museum of Honolulu. He demonstrated his thesis by drawing upon his knowledge of the South Sea Island cultures, and the uses made in them of such plants as sugar cane, coconuts, breadfruit, taro, gourds and sweet potatoes. Ethnobotany is closely related to a number of cultural complexes, and therefore has an important part to play in the study of culture.

The sessions of section H were closed by Percy C. Madeira, of the Museum of the University of Pennsylvania, who said that chronological study of the known historical dates associated with the great ancient civilizations of southeastern Asia and the East Indies demonstrates that none of these ruins were built prior to the seventh century A. D., which likewise marks the close of the first epoch of the famous Maya civilization of Middle America. It is clear, therefore, on purely chronological grounds, without considering other equally important factors, that the complex civilizations of the East Indies could not have influenced the similar complex civilizations of the New World.

SECTION I (PSYCHOLOGY)

(Reports from Harry W. Hepner, Gordon L. Barclay and Wesley R. Wells)

The "Industrial Psychology" symposium was opened by the chairman, Dr. Paul A. Achilles, Psychological Corporation, with a paper, "Salvaging Old Age in Industry." He said that recent investigations of psychologists indicate that learning capacity continues much longer than has been supposed. Studies made by E. L. Thorndike, Walter R. Miles, Edward K. Strong, and Lillian J. Martin, indicate that age only is not a sound measure of fitness for a given job. Individual differences are far more important than age differences, and the employers should consider the applicant's personal fitness for the job rather than his age alone. Dr. R. M. Little, chief of the Rehabilitation Bureau of the New York State Department of Education, said that some of the physically handicapped develop mental abnormalities that tend to handicap them still further, whereas others have unusual resilience and flexibility in making adjustments to new occupational limitations. Dr. M. R. Trabue, of the University of Minnesota, described the diagnostic work of the Minnesota employment study and operational patterns developed for successful and unsuccessful workers in important occupations. In general, the symposium indicated some of the ways in which psychologists are attempting to meet the needs of the aged, physically handicapped and the unemployed.

Dr. John Levy, of New York City, opened the symposium on "Mental Hygiene," on Friday morning with an address in which the present status of mental hygiene was reviewed and the purpose of the symposium was stated. Dr. Paul Popenoe, director of the Institute of Family Relations in Los Angeles, in presenting the contribution of heredity to the field of mental hygiene reviewed the evidence of hereditary factors in mental deficiency and psychoses. Dr. Ruth Benedict, of Columbia University, declared that normality in behavior is a man-made, culturally defined concept and that anthropology may point out ways in which our own culture may be improved and means by which the "misfits" or "abnormals" in our culture may be better utilized. Dr. Mary E. Johnson, of the department of sociology, Syracuse University, in presenting the point of view of the scientific sociologist said that the sociologist seeks norms of behavior and the deviates from them. Sociology may contribute normal data to mental hygiene to offset of the current preponderance of abnormal data. Mental hygiene workers need sociological training in order to interpret properly social data. Dr. Shailer Lawton, of New York University, said that analysis

of various levels of organismic behavior shows that only a very small proportion is cortically controlled. Differences in glandular balance provide the basis for various personality types. Mental hygienists may avoid much futile effort by a proper understanding of these factors. Dr. Bertram Lewin declared that psychoanalytic therapy is of invaluable assistance in the clinical treatment of many types of cases. He said that psychoanalytic theory has provided a psychology of instinctual activity, empirically grounded, which no other science can supply. Dr. George Mohr, of the Child Guidance Clinic of Pittsburgh, indicated that the task of psychiatry is an integrative one, interpreting behavior from a psychobiological standpoint. Dr. Gilbert J. Rich, of the Institute for Juvenile Research, Chicago, outlined the contributions of psychology to the development of mental hygiene. He said that studies of individual differences in the latter half of the past century gave way to the beginnings of clinical psychology and the mental testing movements. The major contribution of psychology has been the introduction of objective methods in dealing with the problems of mental hygiene. The techniques of correlational studies and standardization methods may be cited as examples.

A luncheon for the speakers provided opportunity for informal discussion. Gordon L. Barclay, clinical psychologist of Syracuse University, opened the afternoon session with a résumé of the morning's contributions. Approximately 140 persons attended the symposium.

The ninth meeting of the Upper New York Psychologists was held on Wednesday and Thursday, June 22 and 23. The Wednesday afternoon session was devoted to papers in the fields of educational and of social psychology. The group was honored by the attendance of Dr. J. McKeen Cattell at the dinner on Wednesday evening. The Thursday morning session consisted of a round-table discussion of experimental work in progress in the laboratories represented. There was extended discussion of reports on experiments bearing on Gestalt theories. The final session, on Thursday afternoon, was devoted to papers on learning in horses, paradoxical warmth, the perception of visual motion and the development of tolerance for a caffeinated beverage, and other topics.

SECTION K (SOCIAL AND ECONOMIC SCIENCES)

(Reports from H. Hotelling, H. S. Kantor, S. S. Wilks and F. G. Crawford)

All meetings of Section K were held jointly with the affiliated Econometric Society. Mr. R. H. Whitman, of the University of Chicago, opened the Tuesday morning session, devoted to a symposium on

"Demand," with an account of his work on the fitting of demand functions of more general types than those used by H. L. Moore to price data for iron and steel. Terms involving the rate of change of price and the time-integral of price were included in various combinations. High multiple correlations were obtained for each of the periods 1902-1915, 1916-1920 and 1921-1930. Dr. C. F. Roos showed how the effect of past prices and the memory of past purchases lead to a demand function containing an integral either of past prices or past purchases, the two forms being equivalent on account of the invertibility of the linear integral equation. He declared that in the newer view of demand the concept of utility will be demoted from a major to a very minor place. In the final paper of the session an experimental study of indifference curves was described by Dr. L. L. Thurstone, of the University of Chicago.

On Wednesday morning Dr. Ragnar Frisch, of the University of Oslo, considered the problem of finding several types of linear regressions which are invariant under a general, linear transformation. Dr. S. S. Wilks, of Columbia University, showed how the work of Professor Frisch can be connected with the theory of small samples. He described his recent work, which has yielded the sampling distributions of determinants of covariances and of certain ratios of these determinants. This distribution, which has a very wide range of applications, generalizes R. A. Fisher's analysis of variance distribution. By setting up an analogy with physical systems Professor H. T. Davis, of the University of Indiana, showed how the problem of perturbation in economic series has all the essentials of the problem of explaining the methane spectrum by means of the perturbations of the atoms. Dr. A. J. Lotka, of the Metropolitan Life Insurance Company, gave a mathematical approach to the problem of industrial replacement which has been previously considered by E. B. Kurtz on an empirical basis.

A report on mathematics needed in the social sciences, adopted by the Social Science Research Council after the deliberations of a committee on the subject, was read by Dr. Mordecai Ezekiel. Sections A and K approved the recommendations that undergraduates should, in preparation for work in the social sciences, study logarithms, graphic methods, interpolation, equations and forms of simple curves, probability, and the elements of differential and integral calculus and curve fitting.

The Thursday afternoon symposium on agricultural supply and demand functions was opened by Professor F. A. Pearson, of Cornell University, who gave the results of a study of the relations between

the supplies of corn, potatoes, wheat and beef in various localities of the United States and prices (in some cases retail and in others wholesale prices) in New York City. In the next paper Dr. Mordecai Ezekiel examined various functional set-ups for the demand curves of two competing products. In particular, he discussed the cases where the price of each product is expressed as an additive function of the supply of both, and where the price of each is expressed in terms of its own supply and the price of the other. In the last paper of this symposium Dr. Louis H. Bean, of the Department of Agriculture, discussed the derivation of instantaneous demand-supply curves, characteristics of shifts in demand curves and a type of demand-supply curve which represents the response of producers to price in future planning.

Professor T. N. Carver began the Thursday morning symposium on money and credit with a paper which outlined the manner in which the expansion and contraction of credit affect business and prices. Dr. Carl Snyder, of the Federal Reserve Board, in speaking on the concept of momentum and inertia in economics, illustrated the long-period movements of economic variables with elaborate colored charts. Professor M. D. Anderson, of the University of Florida, presented a paper on a theory of interest from the equation of exchange. Alvin H. Hansen, Professor Joseph Mayer, Dr. H. Hotelling, Frederick V. Waugh, H. S. Kantor, S. S. Wilks, Professor J. A. Shohat, Dr. E. R. Hedrick and many of those who gave papers contributed to the discussions.

Following this session members of the society motored to Ithaca, where as the guests of Cornell University they were shown about the campus, including particularly the statistical laboratories presided over by Professor G. F. Warren and Professor F. A. Pearson. The meeting ended with a delightful picnic in Cascadilla Gorge.

SECTION L (HISTORICAL AND PHILOLOGICAL SCIENCES)

(Report from Ralph V. Harlow)

The sessions of Section L, on Tuesday, June 21, were arranged and conducted by the officers of the New York State Historical Association. The morning session, with Dr. Dixon Ryan Fox, of Columbia University, presiding, was devoted to certain aspects of the social history of New York State in the early nineteenth century. Papers presented by Mr. J. R. Curtiss, Mr. C. DeWitt and Miss B. M. Stearns furnished the stimulus for lively discussion of certain highly significant aspects of the social history of those days.

In the first afternoon session, Dr. A. C. Flick, state historian of New York, read a paper on "Some Aspects of New York History." After a brief reference to the great value and importance of local history, he pointed out the nature and the significance of the Indian, the Dutch and the French contributions to the early development of New York. He emphasized the fact that historians generally have been inclined to underestimate both the Indian and the French influence.

Dr. Frederick S. Parkhurst, of Kenmore, New York, delivered a paper on "The Biography of a Town," a survey of the history of Lyndon, New York, with an analysis of the causes of its rise and decline. Although Dr. Parkhurst confined his attention to a single town, the principles which he brought out were typical of the rural history of both New York and New England.

The final session was devoted to a general address by Dr. Dixon R. Fox, Columbia University, on "Refuse Ideas and Their Disposal" (see General Sessions).

SECTION M (ENGINEERING)

(Report from N. H. Heck)

The meeting of Section M consisted of two sessions, the first with papers related chiefly to industrial engineering and the second a symposium held jointly with Section E on "Aerial Photographic Surveying and Mapping." In the first Dr. Myron A. Lee showed that the problem of production control and material control is the same in all plants, even though the methods differ. He described the scheme used in a medium-sized plant in detail. In mass production the methods are somewhat simplified. While the principles are well understood they have been applied only to individual industries and not to industry as a whole, and this lack of planning may in part at least be a cause of the present conditions in industry.

Dr. Donald A. Laird presented the results of a study with collaborators of the effect of noise on output with special reference to the rôle of diet in relation thereto. A high carbohydrate diet lessens the worker's feeling of fatigue and not only increases production under quiet conditions, but under conditions of moderate noise is equivalent to low carbohydrate diet under quiet conditions.

Mr. Kenneth C. Reynolds showed that the proper design of many river and harbor improvements, of dams and of hydraulic features of hydroelectric and irrigation projects has been taken from the realm of trial and error and made a scientific up-to-date procedure. This is accomplished through the use of a miniature of the proposed hydraulic structure over

which a properly regulated flow of water duplicates nature.

In the symposium on aerial photographic mapping, Mr. Charles Davey gave a history of the development of this art in the United States. Though the fundamental principles of perspective were first noted in 1759 and apparatus was developed in 1849, it was not till 1900 that stereo-photography laid the basis for a photographic method universally applicable to mapping. Multiple chamber cameras have been developed through the cooperation of several government bureaus and recently a five-chamber camera has proved especially effective. Professor Earl Church stated that at Syracuse University special attention has been given to mathematical analysis based on measurement of aerial photographs. Mr. L. H. Caldwell described the use of the aerocartograph, a German apparatus, which is specially useful in connection with the extension of aerial triangulation. Mr. H. L. Cooke, under the title "Photosculpture," after pointing out certain weaknesses of aerial methods under unfavorable conditions explained how with two projection cameras correctly oriented it is possible to form a model of the terrain which can be carved on a block of suitable material. With proper orientation the composite images will be sharply defined only when the material to be carved is at the right height. Mr. Irving H. Crosby pointed out the great value of aerial photography in geological studies, especially in a poorly mapped region.

SECTION N (MEDICAL SCIENCES)

(Report from M. S. Dooley, C. M. Schwartz, G. S. Hucher, E. F. Adolph and Earl E. Moch)

The program of Section N was such as to interest not only those working in the basic sciences, but to a marked degree clinicians of this locality. Community interest was elicited because of the number and kind of organizations participating in the program, which was sponsored by the College of Medicine of Syracuse University. This series of meetings led off with a notable public health program, in which Dr. Thomas Parran, Jr., commissioner of health of the State of New York, and Dr. Wilson G. Smillie of Harvard University School of Public Health, were the speakers (see General Sessions).

One hundred attended the sessions of the forty-fourth meeting of the Western New York Branch of the Society for Experimental Biology and Medicine. An interesting paper on "Synthetic Diets for Herbivora" was given by Dr. J. C. Woodward and Dr. C. M. McCay. They found that both goats and rabbits eat foods containing regenerated cellulose. Weaned kids, when put on a synthetic diet, continued to grow

normally and remained in balance for about one year, the cellulose content of the diet being increased as growth occurred. Young rabbits, when fed a synthetic diet, continued to grow for about one month and then developed paralysis of the hind legs. Muscles of these rabbits were found to be smaller than normal. If alfalfa leaves are fed, this paralysis does not occur. Mature rabbits can be maintained on the synthetic diet for about three months, and then develop a paralysis similar to that of young rabbits.

Dr. E. F. Adolph, M. J. Gerbasi and M. J. Lepore reported that increase of pressure within the abdomen, applied by means of a trocar through the anterior abdominal wall, results in a change of water distribution. W. S. Root said that time is a factor in considering the dissociation curve of carbon-dioxide of muscle and nerve. Dr. W. R. Bloor, E. Buckner and B. F. Gibbs reported that arteriosclerosis causes the death of 47 per cent. of all diabetics. High concentration of cholesterolesters in the blood plasma may be the cause of arteriosclerosis. Professor W. J. Atwell reported that administration of pituitary gland will restore function only when ovary is present and that cortin given twice daily—equally spaced from three to seven weeks—does not produce effect on growth. Professor C. O. Lathrop and C. Burwell said that soaps that are 20 per cent. of original concentration were found to have antiseptic effect on pustular infections. All bacteria were killed in ten minutes. A. G. Eaton and Professor J. R. Murlin reported that cerebroside fraction causes high blood sugar and a low respiratory quotient.

G. H. Maughan said that irradiation of hens increases the Vitamin D content of the eggs produced. The ability of the hen to store Vitamin D is, however, limited. Professor A. Knudson said that sunshine, when combined with low humidity and no smoke, is most effective, especially between the hours of 11 A. M. and 2 P. M. Professor H. C. Sherman, Columbia University, said that Vitamin G is a multiple nutritional factor, of two or more substances, all of which are necessary for growth. There appears to be a wide zone between the minimum and maximum amounts required, but an intake greater than the minimum amount results in the improvement of the health in general. Dr. Shiro Tashiro, University of Cincinnati, reported that increased susceptibility to the action of bile salts is due to decrease of bile salts antagonizers used as phospho-lipids. This results mainly in hemolysis, delay in coagulation time of the blood and also increase in percentage of gastric ulcers.

Professor Frank A. Hartman, University of Buffalo, reported that lack of cortin mainly affects the control nervous system, resulting in twitching, insomnia, etc., and eventually coma. Administration

of cortin causes the symptoms to disappear in the reverse order of their appearance. In normals, cortin administration delays fatigue and also makes possible a more restful sleep. Cortin lessens reflex action and thus reduces heat production, and it also causes a decrease in resistance to toxins. Professor Frank A. Hartman, University of Buffalo, Dr. H. S. Liddell and Dr. O. D. Anderson, Cornell University Medical College, said that administration of cortin to neurotic sheep produces an increase in the magnitude of conditioned reflexes, while at the same time tending to remove the neurosis.

At a joint session of the Onondaga Medical Society and the Syracuse Academy of Medicine, four papers were presented to an audience of 172. Dr. Robert Elman, Washington University School of Medicine, declared that the popular belief that "toxemia" is the cause of death in cases of intestinal obstruction is questionable. The cause of death in untreated complete high obstructions (stomach and duodenum) is probably a physicochemical one. A. C. Silverman, Syracuse University, said that the period of greatest susceptibility of children for poliomyelitis is that from one to nine years of age. Males are more susceptible than females. Outbreaks occur every other year, each outbreak using up the number of susceptibles. This is followed by a year of comparatively few cases, and it is believed that during this period of quiescence a new crop of susceptibles develops. Dr. J. R. Wilson, J. H. Bennett, T. C. Wyatt and Dr. O. D. Chapman, Syracuse University, reported that sensitivity reaction of guinea pigs, previously sensitized to horse serum, was greatly reduced following a fasting period of seventy-two hours.

Edward N. Packard, Saranac Lake, said that about 90 per cent. of autopsy lungs show primary tubercle, usually situated near the pleura. The primary complex may, however, develop elsewhere in the body, such as in the intestine. Primary tubercle may be completely walled off and immunity lost. Those who favor the exogenous theory of the disease are of this opinion. Repeated inhalation of the bacilli are thus more apt to be the cause of the disease than its origin and spread from the primary involvement.

A joint meeting of Sections C, N, F and G and the American Roentgen Ray Society was held on Friday for a symposium on "The Biological Action of X-rays." The symposium was opened with a paper by Dr. Lauriston S. Taylor, of the Bureau of Standards. Experiments conducted at the bureau showed that present physical measurements of the conditions of x-ray treatment in the case of similar biological experiments reported in the literature can not be compared, due to the incomplete data on tube output that is in general given.

Dr. Otto Rahn and M. N. Barnes, of Cornell University, asked the important question, "What is Death?" Three criteria for the decision as to the death of an organism, namely, change in the rate of metabolism, loss of selective permeability of the cells as measured by selective staining qualities and the loss of reproductive power, were compared as to the relative effect of x-rays on production of these changes upon a particular organism.

Interesting papers were presented by Drs. G. Failla, R. E. Herendeen, Douglas Quick, W. P. Davey, H. J. Baggs and R. Isaacs.

Fifty attended a special meeting of the Central New York branch of the Society of American Bacteriologists for the reading of 18 papers. P. Arne Hansen exhibited charts and slides showing the logarithm ten of bacterial counts plotted against time in hours; growth and death of thermophilic bacillus, and generation time at various temperatures. J. D. Brew said that sanitary requirements for milk production at present time are based very largely on opinion. Lantern slides of twelve cases of tularemia (1927-1932) showing occupation, and probable source of infection, were exhibited by Marion B. Coleman. Eleven excellent medical exhibits were presented.

SECTION O (AGRICULTURE)

(Report from T. E. Odland)

Those attending the summer meeting of the Northeastern Section of the American Society of Agronomy met with Section O in a land utilization symposium at Syracuse on Tuesday, June 21. The speakers included Professor G. F. Warren, Professor F. P. Weaver, Dr. J. S. Illick, Professor H. G. Knight, C. L. Rogers and L. R. Schoenmann. At a noon luncheon at the Onondaga Hotel the speakers included Dean Lipman, of the New Jersey Agricultural College.

Following the program at Syracuse the group went to Geneva, where Mr. J. D. Luckett had been very active in arranging an attractive program for visiting agronomists and others in the party. About 60 were present at a noon luncheon at the Pulteney Inn. Following the luncheon a tour of visitation to the various experimental plats was made. The group was especially interested in the Russian lysimeter installation, and experiments in fertilization of orchards, vegetable crops and field crops.

The annual dinner and business meeting of the Northeastern Section was held at the Hotel Seneca in the evening. Professor F. D. Gardner, of Pennsylvania State College, was elected president of the Northeastern Section of the Agronomy Society for the coming year. M. H. Cubbon was elected vice-president and H. C. Swift secretary. Professor Bris-

tow Adams, of Cornell, was the speaker of the evening.

On Thursday morning the agronomists motored to Ithaca, where Cornell University has just completed one of the finest plant industry buildings in existence. Dr. Buckman, of the Department of Agronomy, and Dr. Wiggans, of the Department of Plant Breeding, were the chief engineers of the various trips, to the experimental plats in agronomy, plant breeding and vegetable gardening. Special interest was shown in the cement frame experiments in soil fertility and in the special plant breeding garden being grown for the International Genetics Congress which meets in Ithaca later in the summer.

SECTION Q (EDUCATION)

(Report from William T. Melchior)

Of the twenty-four speakers scheduled to speak before Section Q, twenty-two were present. The programs were run on scheduled time, but interest in the discussions led to "adjourned meetings" following the closing hours. There was really a continuous meeting from 9 to 4:30, as the two-hour noon interim found intact the group before and after the scheduled luncheons.

Dr. M. G. Nelson, of the Albany State College for Teachers, opened the session with a plea for wiser use of state moneys by school administrators, contending that the administrators are now being trained to spend money, not to save it. He felt that education was returning to the days of private schools, because parents felt their children were being jeopardized in the public schools, which are now being so drastically cut in appropriations. Dr. Harry P. Smith reported on the investigations conducted in Syracuse to test the efficiency of the junior high school *vs.* the conventional 8-grade elementary school. His conclusions were that in the conventional set-up there was a greater mastery of the formal skills and knowledges; while in the junior high school there was a significant development of the great life habits and attitudes of initiative, reliability, cooperation and leadership. Dr. Richard K. Piez reported on curriculum problems, contending that in his experience as an administrator in normal schools he had found that the greatest problem is not training how to teach, but what to teach. He felt that much of the curriculum was an inheritance from the past and that youth was not interested in the past. Miss Ruth Eckert declared that there was a high degree of correlation between student success in high-school courses, college orientation and in the regular college courses, but felt that there was a "need for a more searching scrutiny of the manner in which varying procedures influence student achievement—for a closer

linkage between the philosophy of progressive education and the techniques of the more objective methods of evaluating outcomes of college instruction." Professor Rex B. Cunliffe, of Rutgers University, gave a rapid survey of the changes in the life patterns of workers, concluding that "vocational guidance is fundamentally concerned with preparing and helping people make wise decisions, to solve vocational problems intelligently, to meet vocational situations effectively." Dr. Wm. T. Melchior declared that "there are two aspects of science that relate to creative, cooperative supervision. First, science as a body of organized knowledge; second, science as a mode of thinking. In democratic supervision there is danger of basing method too much upon a body of organized knowledge. The findings of science are not fixed according to Dewey's concept of the scientific method. Scientific method in supervision must first of all consider the teachers mind set. She must be put, not on the defensive, but on the offensive. She initiates testing, objective data-gathering and remedial measures. The method is inductive."

Dr. Warren W. Coxe, of the State Department of Education, New York, said that there was no definite conclusion to be made on the desirable size of a high

school, for "we can say with some assurance that the very small high school fails to offer a curriculum of sufficient variety and we can say that the very large high school becomes too impersonal." He also felt that "the addition of more courses has not generally solved the question of meeting individual needs, even in the large high schools where the offering is most varied." He concluded that the way to meet pupil needs was through the adaptation of subject-matter and methods rather than by adding courses.

Dr. C. H. Thurber, dean at Colgate University, reported on the new arrangement of tutorial and honors work at his institution, bringing to light information which would validate the continuation of such work at his institution and the initiation of similar work at other institutions.

Dr. Donald Durrell, of Boston University, concluded that: "(1) A group intelligence test score is meaningless unless accompanied by a reading test score; (2) group intelligence tests are greatly affected by school achievement; (3) makers of group intelligence tests have given too much weight to reading ability in these tests; (4) that 'nurture' in the form of achievement in reading has a marked effect on intelligence test scores."

OBITUARY

GEORGE FREDERICK KUNZ, 1856-1932

DR. GEORGE F. KUNZ, whose death occurred on June 29, was a man of eminent attainments in science, of vigorous personality and of indomitable energy. During a long and useful life he has filled with distinction so many high offices that it may well be said that there are few organizations representative of the earth sciences, either local or national, among whose officers he has not served as president or vice-president, and in whose councils his opinion has not helped in the shaping of policy.

Dr. Kunz was mainly educated at the Cooper Union of Arts and Sciences in New York City, an advantage to which he gives grateful credit in the dedication of one of his books. Very early in life he showed a marked talent for the science of mineralogy, and began the building up of a number of collections of minerals which are to-day on display in as many colleges and museums.

His knowledge of gems and gem minerals was recognized as international, a fact that is attested by his lifelong connection as gem expert with the greatest firm of jewelers in the world.

From early youth a New Yorker, Dr. Kunz was associated through five decades with his fellow citizens of prominence from a social as well as from a

scientific view-point, and it is doubtful if any of these lived a fuller or a more interesting life, or were more highly honored in the community.

In addition to between 400 and 500 papers on subjects as varied as minerals, meteorites and folklore, Dr. Kunz was the author of "Gems of North America" (1890), "The Book of the Pearl" (jointly with Charles H. Stevenson, 1908), "The Curious Lore of Precious Stones" (1913), "The Magic of Jewels and Charms" (1915), and "Rings" (1917). This extensive list of writings, however, by no means exhausted the field of his interests. He was prominent in such movements as the introduction of the metric system into this country, the development of the uses of radium, and the preservation of scenic and historic monuments.

Inevitably a personality favored with such gifts and attainments must claim honorable recognition. Dr. Kunz was not only the recipient of several honorary degrees but was also distinguished by the decorations of Officer of the Legion of Honor (France), Knight of the Order of St. Olaf (Norway) and Officer of the Rising Sun (Japan).

His scientific interest was always closely linked with the American Museum of Natural History, at which institution he served as research curator of gems from

1904 to 1918, and as research associate from 1918 to the time of his death.

In his passing away science has lost an enthusiastic and prolific contributor, New York, one of her most prominent and distinguished citizens, and a considerable part of America's men of science, a generous and devoted friend.

HERBERT P. WHITLOCK

AMERICAN MUSEUM OF NATURAL HISTORY

RECENT DEATHS

DR. MICHAEL OSNATO, director of the department of neurology of the New York Post-Graduate Medical School, died on June 15.

DR. HERMANN VON W. SCHULTE, dean of the Creighton University Medical College since 1917, died on July 15, at the age of fifty-six years.

THE death on July 10, at the age of seventy years, is announced of Sir Richard Threlfall, consulting engineer, formerly professor of physics at the University of Sydney, Australia.

A CORRESPONDENT writes: "Miss Adelaide Ames, research assistant in the Harvard Observatory, was drowned in a canoe accident in Squam Lake, New Hampshire, June 26. Her scientific work, thus suddenly ended at the age of thirty-one, had already gained for her a wide recognition. She was a member of the Commission on Clusters and Nebulae of the International Astronomical Union and was Secretary of the Local Committee for the entertainment of the Union in Cambridge in September. For several years Miss Ames had carried on investigations in the field of extra-galactic nebulae; her principal publications deal with the Coma-Virgo cloud of galaxies. Her most important work has been in connection with a photometric survey of all extra-galactic objects to the thirteenth magnitude—a census of the inner parts of the Metagalaxy to a distance of five to ten million light years. This survey was completed in June and will be published during the next month in collaboration with Dr. Shapley."

SCIENTIFIC EVENTS

THE TEACHING LOAD IN THE LABORATORY SCIENCES

A COMMITTEE of the Virginia Academy of Science, with Professor Wm. A. Kepner as chairman, has under consideration Standard 7 of the Association of Colleges and Secondary Schools of the Southern States. This standard reads "Teaching schedules exceeding sixteen hours per week per instructor shall be interpreted as endangering educational efficiency. In general, two laboratory hours will be counted as equivalent to one recitation hour."

This committee regards with grave concern violations of the first provision of this standard and commends attention of the association to the desirability of giving consideration to cases of excessive teaching loads.

The committee is equally concerned with excessive loads apparently permitted under the second provision of Standard 7. As early as 1927, the Virginia Academy of Science adopted a resolution directing the attention of the Association of Colleges and Secondary Schools of the Southern States and of the administrators to the inequity that this standard's application had caused.

Further notice of this situation was taken by the academy at its recent meeting. It adopted the following recommendation of its committee.

The committee recommends that the Virginia Academy of Science direct the attention of the Association of Colleges and Secondary Schools of the Southern States to the fact that its Standard 7 imposes a serious handi-

cap upon the teachers of science by its method of evaluating the teaching load of laboratory instructors and that in this manner its standard endangers educational efficiency and hinders the development of research in southern institutions.

This move on the part of the academy is based upon the conviction that experience does not sustain the inference that an hour's teaching in the laboratory requires less total time, energy or quality of effort than one hour of instruction by lecture. Indeed, when it is taken into account that collection of material and construction of equipment and the care of materials and apparatus are usually a part of the burden of laboratory instructors, it must be recognized frankly that an hour spent in the laboratory represents quite as great a load as does an hour of lecture-room effort.

The committee was instructed to inform the Association of Colleges and Secondary Schools of the Southern States, the National Research Council and the American Association of University Professors concerning the academy's action. It was further instructed to present an account of the academy's attitude towards Standard 7 to the editor of *SCIENCE* with a request for publication as an invitation to other individuals and organizations interested to join in the effort to remove this handicap under which instruction in the sciences is being conducted.

THE DENVER MEETING OF THE AMERICAN CHEMICAL SOCIETY

THE eighty-fourth meeting of the American Chemical Society will be held in Denver, Colorado, from August 22 to 26.

According to the preliminary program, the president's address will be delivered on the evening of August 24 by Dr. L. V. Redman, on "Some Economic Aspects of Research." The address will be followed by the presentation of the American Chemical Society Award in Pure Chemistry to Dr. Oscar K. Rice, and the Priestley Medal to Dr. Charles L. Parsons. Dr. Rice will make an address on "The Theory of Unimolecular Gas Reactions."

Addresses of the secretaries of the divisions which will hold meetings are as follows:

Agricultural and Food Chemistry: John H. Nair, Research Laboratory, the Borden Company, Syracuse, New York.

Biological Chemistry: J. B. Brown, Department of Physical Chemistry, the Ohio State University.

Cellulose Chemistry: John L. Parsons, Hammermill Paper Company, Erie, Pennsylvania.

Chemical Education: R. A. Baker, 17 Lexington Ave., New York.

Colloid Chemistry: E. J. Miller, East Lansing, Michigan.

Gas and Fuel Chemistry: O. O. Malleis, 5557 Woodmont St., Pittsburgh, Pennsylvania.

History of Chemistry: Tenney L. Davis, the Massachusetts Institute of Technology.

Industrial and Engineering Chemistry: Erle M. Billings, Eastman Kodak Company, Rochester, New York.

Medicinal Chemistry: H. C. Hamilton, Parke, Davis and Company.

Organic Chemistry: A. J. Hill, Yale University.

Paint and Varnish Chemistry: Robert J. Moore, Bake-lite Corporation, Bloomfield, New Jersey.

Petroleum Chemistry: F. L. Koethen, Niagara Falls, New York.

Physical and Inorganic Chemistry: D. H. Andrews, the Johns Hopkins University.

Rubber Chemistry: H. E. Simmons, Municipal University of Akron.

Sugar Chemistry: E. W. Rice, National Sugar Refining Company of New Jersey, 129 Front St., New York.

Water, Sewage and Sanitation Chemistry: E. J. Theriault, U. S. Public Health Service, Cincinnati, Ohio.

There will be the usual excursions, entertainments and dinners.

ECONOMIES IMPOSED ON THE U. S. GEOLOGICAL SURVEY

IN response to a request from the editor of SCIENCE, Dr. W. C. Mendenhall, director of the U. S. Geological Survey, has sent the following statement in regard to the effect of the economy bill on scientific workers in the Geological Survey:

The Legislative Branch Appropriation Act for the fiscal year ending June 30, 1933 (Public—No. 212—72nd Congress), includes as Part II the provisions of what

was frequently referred to as the "economy bill." These provisions, taken in relation to the appropriations made for the Geological Survey, will affect the survey and its workers in ways that will not be fully known until certain interpretations, regulations and decisions are announced by the president and other federal officers and agencies.

In general, the effects may be summarized as follows: All the scientific workers (and practically all others) of the survey will this year automatically lose one month's pay by furlough; will perhaps be furloughed for additional periods of duration yet unknown (and some may be dismissed); will permanently have annual leave with pay reduced to 15 days and will receive none this year; will receive no salary promotions this year and will hereafter receive smaller subsistence allowances when traveling. Moreover, of its employees past retirement age, three geologists have been separated, one has been retained and the case of one (the chief geologist) is still pending. The survey, with greatly reduced funds, will operate with a smaller staff and will curtail its field work and other projects.

In more detail, the effects of the several provisions (as now known or possible) may be outlined as follows:

(1) During the present fiscal year every employee receiving more than \$1,000 per annum will be furloughed without pay for the equivalent of one calendar month. The parts of appropriations unexpended by reason of this furlough may not be expended by the survey but will be impounded and returned to the treasury.

(2) All rights to annual leave of absence with pay are suspended during this fiscal year. (Sick leave is not disturbed.)

(3) No "administrative promotions" in salary may be made during the year. (Advancement of an employee from a lower grade to fill a vacancy in a higher grade, if permitted, does not constitute such a promotion, and the salary prescribed for the higher grade may then be paid.)

(4) No vacancy may be filled during the year (except "absolutely essential positions," with the president's approval, and temporary, emergency, seasonal or co-operative positions); the parts of appropriations unexpended by reason of such vacancies may not be expended by the survey but will be impounded and returned to the treasury unless the president waives such impounding because, "in his judgment, such action is necessary and in the public interest."

(5) During the year all persons having reached or reaching retirement age will be separated from the service (even though serving on an "extension"), unless specifically exempted by the president because required by the public interest. Under this provision nine employees of the survey were retired at the close of June 30; these include three geologists—Edward O. Ulrich, Marius R. Campbell and Frank C. Schrader. David White, formerly chief geologist, was exempted by execu-

tive order and continues in the service. Three other employees, including Timothy W. Stanton, the present chief geologist, were exempted for a period of one month to permit further study of their cases and determination as to further exemption or retirement.

(6) Maximum allowances for subsistence while in a travel status have been reduced.

(7) Annual leave with pay has been heretofore possible up to 30 days a year; hereafter it may not exceed 15 days a year but unused parts may be cumulative for any succeeding year. (As already stated, annual leave is entirely suspended during the present year.)

(8) In order to keep within the appropriations during 1933 and yet to avoid dismissing employees, the secretary is authorized and directed to furlough employees without pay for such time as necessary, the higher salaried to be furloughed first wherever possible without injury to the service. Regulations by the president governing such furloughs have not yet been promulgated. The survey's appropriations have been sharply reduced, but as discussed hereafter, under (10), the amount of

such furloughs that may be necessary this year can not now be determined.

(9) The secretary, with the approval of the director of the bureau of the budget, may transfer not to exceed 12 per cent. of any appropriation for the department to any other appropriation for the department; but no appropriation may thus be increased by more than 15 per cent. It is not yet known whether any of the survey appropriations will be thus augmented.

(10) In view of the considerable reductions in the several survey appropriations (ranging from 12.1 to 60 per cent. below the funds for the past fiscal year), projects and field work must be correspondingly curtailed and the payroll reduced. However, until it is known whether the survey will receive any transferred funds as discussed under (9) and whether it can use any of the money saved by vacancies caused by retirements, resignations and deaths, as discussed under (4), it will not be possible to determine how much additional furloughs need be enforced to avoid dismissing employees, as discussed under (8).

SCIENTIFIC NOTES AND NEWS

DR. EDMUND B. WILSON, Da Costa professor of zoology at Columbia University, has been elected a corresponding member of the Vienna Academy of Sciences.

DR. CARL CORRENS, director of the Kaiser Wilhelm Institute for Biology, Berlin, has been elected a foreign member of the Physiological Society at Lund.

DR. PETER DEBYE, professor of physics at Leipzig, has been elected a member of the Royal Society in Upsala and of the Academy of Sciences (dei Lincei) at Rome.

At a recent meeting of the Linnean Society, London, the following were elected foreign members: Professor Klas Robert Fries, director of the Botanic Garden, Stockholm; Professor Eduard Fischer, professor of botany at the University of Bern and director of the Botanical Institute; Professor Ludwig Jost, director of the Botanical Institute and Gardens, University of Heidelberg, and Professor Emile Topsent, professor of zoology and comparative anatomy, University of Strasbourg. At the anniversary meeting of the society on May 24 the following officers were elected: Professor Frederick Ernest Weiss, *president*; Mr. Francis Druce, *treasurer*; Mr. John Ramsbottom, *botanical secretary*, and Lieutenant-Colonel John Stephenson, F.R.S., *zoological secretary*. The Linnean Gold Medal was awarded to Dr. Edwin Stephen Goodrich, Linacre professor of zoology and comparative anatomy at the University of Oxford.

ARTHUR NEWELL TALBOT, professor emeritus of municipal and sanitary engineering at the University of Illinois, was awarded the Lamme Medal at the

fortieth annual meeting of the Society for the Promotion of Engineering Education held at the Oregon State College.

THE first National Achievement Award of the Chi Omega Sorority was conferred on June 27 on Dr. Florence R. Sabin, member of the Rockefeller Institute for Medical Research. The award, in the form of a medal executed by Miss Frances Grimes, was made "in recognition of notable achievement by a woman by other women."

ACCORDING to the *Journal* of the American Medical Association, Dr. Ugo Lombroso, Tunis, and Dr. J. Taboriski, Palestine, have been awarded the International Trachoma Prize of 2,000 Swiss francs, offered by the royal Hungarian minister of public welfare and labor for an essay on the etiology of trachoma. Honorable mention was given to Drs. Cattaneo, Sassari; P. Olitsky, New York; Roth and Kanyo, Budapest, and C. Trapezontzewa, Moscow.

DR. WILLIAM P. BROOKS, who has been connected with the Massachusetts State College at Amherst since 1889, from 1906 to 1918 as director of the agricultural experiment station, received at the commencement of Amherst College the degree of doctor of agriculture.

FERDINAND N. MENEFFEE, professor of engineering mechanics at the University of Michigan, was given the honorary degree of civil engineer at the annual commencement exercises of the University of Nebraska.

DR. MARTIN H. FISCHER, professor of physiology at the University of Cincinnati, received the honorary

degree of doctor of science at the annual commencement of Wittenberg College, at which he delivered the principal address.

At the University of Birmingham retirements from the faculty with the title of professor emeritus include Professor F. W. Burstall, formerly dean of the faculty of science, subsequently vice-principal, retired from the chair of mechanical engineering; Professor L. P. Gamgee, retired from the chair of surgery; Professor A. R. Ling, retired from the chair of brewing and the biochemistry of fermentation.

PROFESSOR ALFRED VIVIAN, dean of the College of Agriculture of the Ohio State University, has retired from active service with the title of dean emeritus of agriculture.

DR. OSCAR M. SCHLOSS, professor of pediatrics at Cornell University Medical College and director of the pediatric service at the Nursery and Child's Hospital, has been appointed pediatrician-in-chief of the New York Hospital. Dr. Schloss will be at the head of the Children's Hospital at the new medical center which opens on September 1. He will give all his time to the work of the hospital and to research and teaching conducted in association with the Cornell University Medical College.

DR. ALBERT CARL FURSTENBERG, associate professor of otolaryngology, has been named successor to the late Dr. Roy Bishop Canfield as professor of otolaryngology in the Medical School of the University of Michigan.

THE directorship of the department of neurology of the New York Post-Graduate Medical School, made vacant by the death of Dr. Michael Osnato, will be filled by Dr. James Louis Joughin, professor of clinical neurology. Pursuant to the terms of the agreement between Columbia University and the Post-Graduate Medical School, at a meeting of the trustees, Dr. Joughin was appointed as acting executive officer of the department of neurology at the Post-Graduate Medical School. Dr. Joughin has been on the staff since 1910.

DR. JOHN REGINALD BATES has been appointed assistant professor in the department of chemistry of the University of Michigan for the year 1932-1933, to succeed Dr. David M. Lichty, who retired on June 30.

DR. A. C. MENZIES, formerly professor of physics at University College, Leicester, has been appointed professor of physics at University College, Southampton.

M. NICOLLE, director of the Pasteur Institute at Tunis, has been appointed to the chair of medicine at the Collège de France.

M. CATHALA has been named professor of chemistry at the University of Toulouse to succeed M. Sabatier.

DR. H. J. DEUEL, JR., professor of biochemistry in the University of Southern California, has been awarded a research grant by the Committee on Scientific Research of the American Medical Association, for a study of the difference in carbohydrate metabolism between the sexes.

THE department of chemistry of Brown University has awarded its annual prize, a year's membership in the American Chemical Society, to Charles F. Fisk, of Pawtucket, Rhode Island. This prize is given each year to the member of the junior class who has shown by his past record and general ability the greatest promise of future success in the field of chemistry.

PROFESSOR ARTHUR E. WOOD and Professor George E. Uhlenbeck, of the University of Michigan, have been granted leave of absence for the first half of the academic year 1932-1933.

PROFESSOR WARREN D. SMITH and Mr. Louis Henderson, of the University of Oregon, will conduct a cruise along the Yukon River as a summer extension course, devoting especial attention to the geology, geography and botany of the regions visited. The cruise will last from July 19 to August 27.

VICTOR H. CAHALANE, director of the Cranbrook Institute of Science, Bloomfield Hills, Michigan, left on June 13 for the Chiricahua Mountains of southwestern Arizona, where he will spend the summer investigating the correlation of small mammals to vegetation in that area. Mrs. D. T. Ries, botanist of the institute, is engaged in making a botanical survey of Beaver Island, Michigan.

CHESTER W. WASHBURNE, consulting geologist of New York City, recently completed a lecture tour of the following universities: Princeton, Cincinnati, Louisiana, Texas, Stanford, California and Oregon. At the University of Oregon the honorary degree of doctor of science was conferred upon Mr. Washburne in recognition of his special contributions to the geology of Oregon, and for his general contributions to the geology of petroleum.

THE autumn meeting of the National Academy of Sciences will be held in Ann Arbor, Michigan, on November 14, 15 and 16.

THE British Medical Association will hold its centenary dinner at Albert Hall, London, July 28, during the annual meeting. Lord Dawson of Penn, president-elect of the association, will preside and the Prince of Wales will be the principal guest.

THE cornerstone of the new Public Health Service Building, now under construction in Washington, D. C., has been laid by Secretary of the Treasury Ogden Mills. According to a note in the *Journal* of the American Medical Association it is expected that the building, which will house all the administrative activities of the public health service, will be completed early in 1933. The structure will occupy an entire square on Constitution Avenue between Nineteenth and Twentieth Streets, N.W., facing the grounds of the Lincoln Memorial. It will be four stories high and will have cost, when completed, \$900,000, exclusive of the cost of the site. The exterior of the building is to be of white Georgia marble with limestone facing in the courts; the architecture is of a modified classical type, with window frames, spandrels and other exposed metal work of satin finish aluminum and the roof of slate colored tile, with slight variation of shade. A small auditorium will be available on the first floor for conferences, lectures and display of health exhibits, and a comprehensive public-health library will be installed in modern quarters in the center wing on the second floor.

THE *Journal* of the American Medical Association reports that in order to carry out a program of research on plague, the establishment of a Plague Research Institute in Yulin, China, was recommended in a report in the *Chinese Medical Journal* of the investigation of an outbreak of plague late in 1931. Yulin was considered the best location for this institute, because it is practically in the center of the plague focus. It was recommended that the institute have its own power station, stables, water supply, bath, dwelling houses, laboratory and library. The recent outbreak of bubonic and pneumonic plague in Shansi and Shensi was unusually extensive and advanced into districts heretofore unaffected. It resulted in a special investigation by a mission sent by Dr. J. Heng Liu, director of the national health administration. In Lin Hsien County alone, it was said, eighty-five villages were infected, with more than 1,000 deaths. One of the most severe outbreaks occurred near Mutoi. The first report of Dr. Percy T. Watson, director of the hospital at Fenchow, Shansi, showed that 100 villages were infected.

The *Geographical Journal* notes that the seventy-fifth anniversary of the Geographical Society of Vienna was celebrated at an evening session, the program of which is described in the *Mitteilungen* of the society. The president, Professor Eugen Oberhummer, in an address reviewing its activities, dwelt upon its influence in promoting geographical education, in cooperation with the university, and through organized excursions. He also referred to the sup-

port given to expeditions, notably those of the *Novara* and of Weyprecht and Payer. To mark the occasion, the society had appointed four honorary members, one of whom was Sir Francis Younghusband. Professor H. Hassinger then spoke upon the progress and future of geographical studies in Austria. He emphasized the value of up-to-date topographical maps for all branches of the study, and described the present position: one twelfth of the country has been re-surveyed for the new 1:50,000 map, but the fraction of published sheets is naturally considerably less. The cadastral map is further in arrears, though the new survey of the Burgenland communities is in progress. As Austria possesses a survey on the scale of 1:28,800 dating from the second half of the eighteenth century, and on the scale 1:2,880 from the early nineteenth century, a new survey, for historical reasons alone, would be of great value. Professor Hassinger then described the work which was still to be done in investigating the geology, geomorphology and economic and human geography of Austria.

THE annual inspection of the experimental plots and laboratories at Rothamsted, according to *Nature*, was made the occasion of the official opening of a new block of buildings at the farm and the inauguration of an extensive electrical installation in the farm buildings. The Right Hon. Sir John Gilmore, Minister of Agriculture, declared the buildings open, in the presence of a large gathering of guests representing all branches of agriculture and the allied industries, and many of the visitors came from distant parts of the Empire. The new block of buildings will serve both the field experimental and demonstration sides of the farm. It contains an artificial manure store, working and office accommodation for the field experimental staff, and equipment to deal with the drying and preparation of the numerous samples taken in the course of the modern experiments. The purpose of the demonstration room is to facilitate the presentation of the field results which have direct practical interest in a way which is easily grasped by visitors. Diagrams and models take the place of tables of figures. Good types of machinery are illustrated, successful rations fed on the farm are on record, and exhibits of plant disease are set up as they become available. The electrical installation, designed by the General Electric Company, Ltd., will be of the most modern and complete kind, and will provide very valuable information as to the cost and general efficiency of motor-driven farm machinery in comparison with the older oil-driven type.

COMMONWEALTH FUND reports that after many years of consecutive effort, Dr. Frederick Tilney and his associates at the Neurological Institute of New

York seem to have reached the stage of definitive results in their study of multiple sclerosis. During the eleven years in which the fund has shared the cost of this research, existing knowledge of the disease and of its treatment has been greatly clarified. Dr. Tilney is now trying to develop a blood test by which it can be detected in an early phase. At their June meeting, the directors of the fund voted to reserve funds for three further annual appropriations of \$5,000 each to continue and presumably to complete this project. Two years ago the Child Research Council of Denver, associated with the University of Colorado Medical School, reshaped its program and employed Dr. Alfred H. Washburn as full-time director of research. Under Dr. Washburn's leadership, and with promised fund assistance, the council has entered upon the systematic study of growth and development from early infancy through adolescence. A research group has been assembled. The fund will provide \$32,250 this year and next to meet the major part of the council's budget. A reservation of \$12,500, the fourth of five annual subsidies, was made available to the Committee on Effects of Radiation, headed by Dr. W. C. Curtis of the University of Missouri. This committee is conducting a group of studies, of biological, physiological and medical significance in the field of radiation. At Washington University, St. Louis, the study of trachoma in which the fund has been participating has been reorganized, and an appropriation of \$20,887.23 has been made to carry it through the coming year on a somewhat reduced scale.

EXCEPT for some curtailment of the work of the Institute for Child Guidance, the mental hygiene program of the Commonwealth Fund for the coming year, approved by the Board of Directors on June 14, shows no important change. A total net appropriation of \$227,358 provides for the operation of the institute with a professional staff of thirteen persons; for the consultant and research service of the Division on Community Clinics of the National Committee for Mental Hygiene; for the continuance of fellowships in psychiatry at the Institute and the University of Colorado, and in psychiatric social work at the New York School of Social Work and the Smith College School for Social Work (four each this year), the School of Applied Social Sciences at Western Reserve, and the School of Social Service

Administration at the University of Chicago; for further aid to the study of psychiatric education by the National Committee for Mental Hygiene; and for limited psychiatric service at Union Theological Seminary. The Division of Psychiatric Education of the National Committee has taken steps this year toward the evaluation and strengthening of psychiatric education in American medical schools. Dr. Noble and Dr. Ebaugh have visited fifty schools. Fifteen schools have definitely asked advice and assistance in bettering their teaching of psychiatry; ten have provided for increased psychiatric training next year; two have planned to include psychiatric training in the education of pediatricians. Five of the best mental disease hospitals in the country are enlarging their facilities for intern training. The fund will continue in the coming year to pay half the cost of this division's work.

THERE is being printed in *Nature* each week a "Calendar of Geographical Exploration." In the issue of February 13 one of the entries reads: "Feb. 22, 1844.—Between the Mississippi and the Pacific. J. C. Frémont, one of the greatest of American explorers, reached the summit of the snow-covered Sierra Nevada mountains. He had started out in 1842 to explore the route beyond the Mississippi as far as South Pass in Wyoming. He ascended the second highest peak of the Wind River mountains which now bears his name and in the following year reached the Oregon settlements. Thence he turned south and east via the Klamath lakes to north-western Nevada and the Truckee and Carson rivers, covering much previously unexplored country. After crossing the Sierra Nevada he spent the rest of the winter on the Sacramento River, and returned round the southern end of the range to the Great Salt Lake, following the old Spanish trail from Santa Fé to California. Frémont had accompanied J. N. Nicollet, the French explorer, in his survey (1835-40) of the country between the upper waters of the Missouri and Mississippi rivers. In 1841, Frémont headed an expedition to the Des Moines River and thus completed Nicollet's map. His explorations opened up a great part of the country between the Mississippi valley and the Pacific Ocean. Frémont had a varied career, afterwards becoming soldier, politician and multi-millionaire."

DISCUSSION

DOODLE-BUGS AND LAW-MAKERS

In the language of the naturalist we might say that there has been much controversy among law-makers over the study of doodle-bugs. A doodle-bug is defined in the Century Dictionary as the "ant

lion." I happen to have lived in the section of the United States where the law-makers have waged the greatest battles over the question whether it is legal to study the doodle-bug (and have listened to such voices as the late free-silver-tongued orator) and

where many persons are acquainted with the little conical sand pits made by the doodle-bugs but very few persons have actually seen the doodle-bug.

Fifty years ago my black mammy tried to tell me how to see the doodle-bug. A certain incantation was necessary. I am not certain whether this arose from voodooism or some other worship, but if one took a stick and stirred the sand at the bottom of the pit and repeated the words,

Doodle-bug, doodle-bug,
Come out of your hole,

the doodle-bug was supposed to appear.

After trying this with and without the incantation for fifty years, I have concluded that the doodle-bug is deaf or else the spirits that control his destiny are deaf, and it is the stick that pokes the doodle-bug out when it is properly applied to his tail. This is due to the fact that the doodle-bug always burrows in the sand backwards. If the presence of a stick behind prevents this backward motion, he may be successfully pried out of the sand, in which case he feigns death for a short time and may be rather closely observed.

According to some persons, the law-makers are not fighting over the question as to whether one may study the doodle-bug but whether one may study his cousins and his ants as well as his uncles and his aunts. The question is whether the doodle-bug's cousins are legitimate or illegitimate.

One of the foremost American scientists, William Morton Wheeler, has written a book, called "Demons of the Dust," in which he has very beautifully described the doodle-bug and his cousins. In fact, he has quite a number of cousins in all continents of the world, and they are often as different in their habits as two different races of mankind. Unfortunately, doodle-bugs are not very plentiful in cold climates. One of the most intelligent queens of Sweden studied at least the cousins of the doodle-bug, but she had them shipped from further south.

It is too bad that the law-makers have not studied doodle-bugs. Such a study would give them a more philosophical view of life. Thus it might entail considerable emotion to discuss the question of whether the different races of mankind were cousins or the monkey's distant relatives, but one can have a more objective view-point in discussing the cousins of the doodle-bug.

In fact, I believe the doodle-bug himself has a more philosophical view of life than has mankind, since he can often sit for months motionless and just think. Perhaps one might say he is less afflicted with vanity than is the human race. He does not need to claim divine ancestry in order to puff up his pride. Clad in a humble coat of sand, dwelling in a house

of sand, he claims a long line of doodle-bugs in his family tree. His doodle-bug ancestors go back millions of years, their tombs being imperishable rocks. These tombs need no inscriptions, since the mummified doodle-bugs are so perfectly preserved. They are dated by the geological strata. The doodle-bug's cousins also claim an ancient lineage. These family trees are all preserved in the rocks. In such a day of strife and differences of opinion, it is comforting to take over a doodle-bug philosophy.

On holidays I sometimes wander over dry sandy areas and even old battlefields, looking for doodle-bugs, who are still making their conical pits in the dry sand under the shelter of some projecting object. Wars over the same field have not disturbed them in their philosophy. Neither have the law-makers impaired their eternal hope that some day a wandering ant will fall into the pit and thus keep alive the race of doodle-bugs.

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THE RELATION OF DETERIORATION OF ORANGE JUICE TO ITS IODINE REDUCING VALUE

IN the course of investigations on the nature of deterioration of orange juice during storage it was found that direct titration of the juice with standard iodine solution gave a good indication of the extent of browning and of the general deterioration in quality. The iodine titration decreased from 20 to 25 cc 0.01 N I_2 per 50 cc of pasteurized or benzoated juice to less than 2 cc during storage. The decrease in the iodine titration was found to be a good indication of degree of discoloration. Darkening, which normally occurred during storage at room temperature in the presence of oxygen or air, was not perceptible until the iodine titration was low. The greater the darkening, the lower was the iodine titration. The iodine reducing substances present in fresh orange juice were not appreciably changed by the manner of extracting the juice, the amount of suspended pulp, by deaeration for several hours with air or oxygen or by heating. The maturity of Valencia and Navel oranges did not materially affect the initial iodine value, although for Navel oranges it was, in some cases, appreciably higher than that of Valencia juice. In view of the fact that Szent-Györgyi¹ has shown that this reducing factor present in orange juice and other peroxidase containing plants is largely hexuronic acid and that G. C. King and W. A. Waugh² have shown that a pure crystalline

¹ *Biochem. J.*, 22: 1387, 1928.

² *SCIENCE*, 75: 357-358, 1932.

vitamin C preparation is identical in chemical and physical properties with hexuronic acid, the iodine titration of orange juice may serve as an indication of the probable vitamin C potency of preserved orange juice. Further investigations on the effect of maturity, variety and treatment on the iodine value of orange juice and other citrus juices are under way and will be reported shortly. A comparison of the formal titration, which has been found by A. Neithammer³ to give a good indication of the nature of lemon juice, and the iodine titration is also now being studied to determine the probable mechanism of the reactions involved.

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PROPERTIES OF STARCH FROM TROPICAL AND TEMPERATE CLIMATES

In a recent article¹ mistakes occur in the description of the temperature of gelatinization of starches produced by plant families of temperate habitats. The text (page 190) gives this "gelatinization temperature as from 50° to 90° C.," and to have "higher gelatinization temperatures than starch from tropical plant families." It is also stated "that the high temperature of gelatinization of temperate starch corresponds to the higher melting points of hydrocarbons, acids, alcohols, esters and saponins of temperate climates." These three errors are repeated in the summary of the paper on page 192.

The chart on page 189 of the article shows the gelatinization temperatures of starches examined from temperate plant families to extend from 50° to 65° C. This is correct according to the evidence presented by Reichert and McNair, to which references are cited in the paper. As a consequence starches from the examined plant families of temperate habitats have *lower* gelatinization temperatures than starches examined from tropical plant families. Likewise, the *low* temperature of gelatinization of the temperate starches examined *does not* correspond to the higher melting points of hydrocarbons, acids, alcohols, esters and saponins of temperate climates.

It is not to be concluded that all temperate starches necessarily have lower gelatinization temperatures than all tropical starches, nor is it to be concluded that all tropical starches of necessity have higher gelatinization temperatures than all temperate starches. The observation is confined at present to the average values of those starches analyzed by Reichert.

It is of interest to note that both temperate starches and temperate glycerides have higher iodine values than tropical, and that the low gelatinization temperatures of starches coincide with the low melting points of temperate glycerides.

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WATER SOLUBLE MAGNESIUM IN SOILS

SINCE April, 1923, the writer has studied a so-called phosphorus deficiency in highly calcareous soils classified as belonging to the Bearden series as mapped in Cass County, North Dakota. Although many areas of these Bearden soils have the most desirable physical characteristics of any of the soils of the Red River Valley and are admirably adapted to general farm crops, alfalfa yields are not considered satisfactory. Since February, 1928, the writer suspected the presence of water soluble magnesium salts as a factor in this apparent lack of fertility.

A note by Ruigh (*J. A. C. S.*, 51-1456, 1929) suggested a method for the determination of water soluble magnesium in soils. It is briefly: 5 cc of a 1 to 5 water extract of soil is made slightly acid with dilute hydrochloric acid. One drop of a dilute solution of p-nitrobenzeneazoresorcinol is added. When this mixture is made alkaline with sodium hydroxide, a sky-blue lake is formed. Yields of alfalfa and sweet clover grown on soils, which develop this lake from a 1 to 5 water extract, have been markedly increased by the application of superphosphate. The writer is continuing the development of this test as an indicator of water soluble and exchangeable magnesium in highly calcareous soils. The method is simple, rapid and sensitive.

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SCIENTIFIC APPARATUS AND LABORATORY METHODS

A NEW MULTIPLE-UNIT ELECTRODIALYSIS APPARATUS

DURING the last decade the principle of electrodialysis has found extensive application in the vari-

ous fields of science. Intensive studies have been made to develop technique and apparatus which will broaden the usefulness of the process and insure greater reliability for the results secured.

³ *Z. Unters. Lebensm.*, 59: 420, 1930.

¹ James B. McNair, "Some Properties of Plant Substances in Relation to Climate of Habitat—Volatile Oils,

Saponins, Cyanogenetic Glucosides and Carbohydrates," *American J. of Botany*, xix, pp. 168-193, 1932.

One of the basic requirements of such a form of apparatus is that it must be capable of yielding reproducible results. This necessitates control of all disturbing factors and makes desirable, for example, some system of cooling to make possible the maintenance of a constant temperature during the process. Effective stirring of the solution of suspension during electrodialysis hastens removal of the ions and tends to make their removal more complete. This is especially the case in electrodialysis of soils.

With these and other considerations in mind, the writer has designed a modification of the three-compartment electrodialysis apparatus, and a multiple-compartment apparatus with four, five or more compartments. The middle chamber, in which is placed the material to be electrodialyzed, is globular shaped, with a capacity of 450 cc. The distance between the outside edges of the flanges is 8 cm. This bulb is fitted with an enlarged neck at the top and a stop-cock drain at the bottom. The globular shaped chamber gives relatively large volume in relation to the distance between the electrodes, and permits very energetic agitation of the suspension by means of a mechanical stirring device, the agitator of which is inserted through the neck of the chamber.

The cooling system consists of a hollow brass ring which is placed around the neck of the middle chamber. A jet, to which a rubber tube may be attached, provides an inlet for water from the tap, and a series of holes on the under edge of the ring provides an outlet which causes the water to flow down and over the sides of the globular chamber. A pan with an outlet tube attached in the bottom serves as the drain for the cooling water. This cooling system has proved very effective, and under ordinary experimental conditions it eliminates the need for any form of resistance in the electrical circuit.

The end chambers which hold the electrodes are of 125 cc capacity and are similar to those of other types of apparatus in common usage. In the five-compartment apparatus two extra chambers are inserted, one on either side of the middle chamber, and between this chamber and the end or electrode chambers. These have flanges on both sides, and all cathode and anode chambers have an opening in the top and an outlet tube at the bottom. This multiple unit apparatus may, of course, be used with two cathode chambers and one anode chamber, or with three cathode chambers and one or two anode chambers or any similar combination. By a proper choice of membranes and experimental conditions it has been found possible, to a certain extent, to make fractionations of the dialysates in a manner which should be very desirable in the investigation of various types of problems.

The three-compartment apparatus, which is made by the Central Scientific Company of Chicago, is described in detail in an article in the *Journal of the American Society of Agronomy*, Vol. 24, No. 1. A second article with a detailed description of the five-compartment apparatus has appeared in *Soil Science*, Vol. XXXIII, No. 5.

AASULV LÖDDESÖL

VOLL AGRICULTURAL EXPERIMENTAL STATION,
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A LANTERN SLIDE TECHNIQUE

IN SCIENCE for November 21, 1930, there appeared an interesting article on lantern slide technique by J. and J. M. Van De Erve. The following procedures used by the writer will extend to an unlimited degree the methods referred to above.

In addition to the plain slides with india ink drawings the writer has for years used an etched slide which extends the possibilities of visual presentation of illustrative scientific data. With the discovery of a highly translucent glass and good transparent colored pencils the delineations have been decidedly improved. This better grade of etched glass slide and colored pencils have been evolved by the Keystone View Company, Meadville, Pennsylvania.

The technique is quite simple. The etched glass, the size of the regulation lantern slide, is placed over the drawing and traced with an ordinary lead pencil. The colors are used as the subject demands. This slide lends itself nicely to free-hand sketches. The writer has, with the use of the new type of vertical projector that is placed on the lecture table, worked out a scheme of animated drawings. The slide being on the holder in full view right side up, the subject-matter to be illustrated is sketched on the slide as the subject develops, the drawing appearing on the screen above the blackboard in full view of the class. This "modus operandi" has the advantage of having the drawing in a vertical position and makes for clarity by making possible the sketching of details as they are explained. One additional word about the colors referred to above—these are the only colors so far tried that project true to hue.

When using line drawings the writer uses a piece of amber glass in the path of the light, thus avoiding eyestrain from looking into the intense light of the projector.

Add to the above the cellophane slide and one has at hand a wide range of illustrative material easily prepared.

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SPECIAL ARTICLES

THE PRESERVATION OF A POLYVALENT STAPHYLOCOCCUS BACTERIOPHAGE

FOR a period of several months we have been engaged in preparing polyvalent staphylococcus bacteriophage for use in a clinic in a large Eastern hospital, and for investigative work in this laboratory. Obviously a bacteriophage prepared for clinical use should be a very polyvalent one and in addition should be free from contamination and fear of secondary growth. We have kept these two factors in mind constantly.

At various times we have purchased staphylococcus bacteriophages prepared by commercial laboratories and compared the potency of their products with that which we are preparing. One of these samples—a semi-solid preparation—was found to inhibit the growth of many strains of staphylococci as well as streptococci, *B. coli* and *B. dysenteriae*. This inhibiting action was not due to the presence of a strong polyvalent phage, but to an antiseptic, since the inhibiting substance was not transmissible in series and it was not destroyed at 80° C. The protocols of these experiments are recorded elsewhere.¹

Jamieson and Powell² have reported that Merthiolate in a concentration of 1-5,000 may be "used as a preservative for highly potent bacteriophage with little detectable damage." These authors also state that "dense suspensions and broth cultures of bacteria may be rendered sterile by exposure to 1-5,000 to 1-10,000 Merthiolate concentrations for a few days in the ice box." It is hardly possible that the same concentrations of an antiseptic such as Merthiolate which renders bacterial cultures sterile would not have the same effect upon bacteriophage. The studies of Clifton³ indicate that a concentration of 1-10,000 of Merthiolate in staphylococcus bacteriophage incubated at 37.5° C. for 30 days markedly decreases the activity of the phage. Under the same conditions a concentration of 1-100,000 of the antiseptic has very little effect.

A sample of Merthiolate (Solution No. 45 Merthiolate, 1-1,000) was purchased and concentrations of 1-10,000 and 1-100,000 added to a polyvalent staphylococcus bacteriophage. Titrations of the bacteriophage Merthiolate suspensions were made after two hours, at room temperatures; and after five and ten days at incubator temperature (37.5° C.). The strain of staphylococcus used as a test organism was lysed by this polyvalent phage in a dilution of 10⁻⁷. The results are given in Table I.

It appears from these results that a bacteriophage loses a good deal of its potency when it is incubated

TABLE I

Incubation	Temp.	Lysis in dilutions of		
		Bp 8	Bp 8,1: 10,000 Merth	Bp 8,1: 100,000 Merth
2 hours	20° C.	4 + 10 ⁻⁷	4 + 10 ⁻³	4 + 10 ⁻⁵
5 days	37.5	4 + 10 ⁻³	4 + 10 ⁻³	4 + 10 ⁻²
10 days	37.5	4 + 10 ⁻³	4 + 10 ⁻³	4 + 10 ⁻²

4+ = complete clearing in test-tube.

at 37.5° C. for several days. This phenomenon has been observed by d'Herelle, Sertic⁴ and others and we have observed it repeatedly. However, a strong bacteriophage kept at room temperature maintains its initial high virulence for months and even years. Bacteriophage 8 was prepared early in February and is still as active as it was originally. Merthiolate very quickly exerts an injurious effect when mixed with bacteriophage in concentrations of 1-10,000 and 1-100,000, and after two hours' contact one may observe a reduction in potency of the bacteriophage. After five days' incubation the bacteriophage Merthiolate suspensions inhibit the action of the growth of staphylococcus but this is due to the action of the antiseptic, for the same results may be obtained when these tubes are heated at 87° C. for 12 minutes. Furthermore, no plaques were ever observed with the same dilutions of phage antiseptic that inhibited growth in the test-tube. The tube containing bacteriophage without the addition of Merthiolate was killed at the above mentioned temperature, and no action against a susceptible staphylococcus could be observed. Our results indicate that Merthiolate in dilutions up to 1-1,000,000 quickly and permanently destroys bacteriophage.

All staphylococcus bacteriophage prepared in this laboratory is filtered through L5 Chamberland candles, and each candle is heated to red heat in a muffle furnace before it is used again. The polyvalent bacteriophage prepared for the clinic is filtered into a previously sterilized, highly efficient ampoule machine devised by d'Herelle. Every ampoule is subjected to temperatures of 56 to 57.5° C. for one hour for three consecutive days. Between the periods of heating the ampoules are incubated at 33° C. There is no decrease in the potency of a bacteriophage treated in this manner. Furthermore, we have never observed any evidence of growth in the ampoules. Each ampoule is tested for evidence of possible contamination after the final heating by the use of an artificial light (Tyndall effect). Samples of the phage

¹ In press.

² *Am. Jour. Hyg.*, 14, 1931, 218.

³ *Proc. Soc. Exp. Med. and Biol.* 29, No. 4, 1932, 370.

⁴ Personal communication.

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are also inoculated into anaerobic medium and incubated for at least one week.

CONCLUSIONS

Bacteriophage may be prepared and kept for long periods of time without fear of secondary cultures.

No antiseptic need be added.

Merthiolate destroys the action of a staphylococcus bacteriophage within a period of five days at a temperature of 37.5° C.

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EFFECT OF THALLIUM ON GROWTH OF TOBACCO PLANTS

IN view of the recent interest in thallium poisoning^{1, 2} the following preliminary report of the effect of this element on the growth of tobacco is given at this time. The previous papers³ dealing with the effects of this element report the death of the plant, but no mention appears to have been made as to its effects when present in smaller amounts than that causing death. In recent years an extensive search has been conducted as to the cause and the control of the so-called frenching disease of tobacco. Vallean and Johnson⁴ have reported that this disease is due to nitrogen deficiency, but our results have not substantiated their findings. In connection with a study of this disease trials were made of the toxicity of several of the heavy metals as possible causes of the trouble. Thallium in the form of the nitrate was included in this study and produced very decided effects on the growth of the tobacco plant. The element was applied in pot cultures at 35 and 75 p.p.m. based on the air dry weight of the soil after the plants had become established. Three typical sandy loam tobacco soils were used, two of which were held at two moisture contents. The severity of the effects of thallium differed to some extent in the different soils and was greater at the higher moisture contents. In many instances the stem was killed at the surface of the soil. This effect may have been due to the fact that the material was applied in solution and was not leached to any considerable extent from the surface layers. Thallium, when applied as the nitrate, was not leached from an inverted bell jar

containing soil, to a pot below which was watered only by the leachings from the bell jar, in sufficient quantity to affect a tobacco plant growing in the pot, indicating that this element is not readily leached from the soil. This point is being tested further, and it is possible that much smaller quantities of this element will prove toxic if evenly distributed throughout the soil mass.

In solution culture tests one part per million of the element thallium has been found to produce the following described effects. Where the plant is not killed outright thallium toxicity is manifested by a series of effects which are characteristic symptoms of frenching, though the two are not identical in all particulars. The first effect is a slowing down of the growth rate and the development of a lighter green color along the veins of the upper leaves of the plant. The younger leaves as they develop show at first a chlorosis following out the smallest branches of the vascular system, but this chlorosis does not so characteristically originate at the tip and margins of the leaf as is the case with typical frenching. The subsequent growth produces leaves which are decidedly distorted and in many instances may consist essentially of only the midrib. This is followed by a proliferation of the lateral buds resulting in the so-called witches broom effect. These later stages agree very closely with the symptoms of typical frenching, which has been observed so widely in the field on practically all soil types where tobacco is grown but usually only on small local areas in any given field.

Whether the typical frenching disease of tobacco is due to thallium toxicity can not be definitely stated at this time, but it appears that there is much in common in growth manifestations exhibited by the two pathological conditions. It is at any rate a matter of considerable interest to recognize the striking effects on plant growth produced as a result of the toxicity of this element.

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³ W. Knop, Ueber die Aufnahme Verschiedener Substanzen durch die Pflanzen Welche Nicht zu den Nahrungstoffen gehören. K. Sächsische Gesellschaft der Wissenschaften Berichte ueber Verhandlungen. Math-Physische Classe, 35-37, 1883-1885.

⁴ W. D. Vallean and E. M. Johnson, "Tobacco Frenching A Nitrogen Deficiency Disease," *Kentucky Agr. Exp. Sta. Res. Bul.* 281, illus., 1927.

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